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So Any of Us Can Understand

THERE are a lot of us who move dirt, mix concrete, put up steel and do similar heavy work to whom diagrams and formulas and theories are just a confusion. Some of us had all this stuff a long while ago in school. Many of us did not. All of us get the impression when we read the average research report that big words, mathematics and signs have been used to cover up the story of what has been learned. And so to most men who make their living on outdoor construction jobs the word research means everything except plain everyday practical common sense.

Very few research men have grasped this situation. Now and then there is an exception which stands out because it is so unusual. The recent work of the Highway Research Board of the National Research Council is one of these gratifying exceptions.

As noted in these columns some time ago, the Board held an intensely practical meeting at Washington in December. Now the results of that meeting have been summed up in a recently issued bulletin. This bulletin leaves out all the devious ways and paths by which the conclusions were reached. It sets forth briefly in ordinary language what practical men want to know about the net results of studies of several very important subjects that were discussed. Copies of this report are available from Chas. M. Upham, who is director of the Board in addition to his many other activities.

Mr. Upham certainly deserves the thanks of all highway interests for the rapidity with which he has instilled so much practical work into the functioning of the Board. This work shows a grasp of what all except laboratory men want to know about the solution of problems that must be studied theoretically if progress is to be made in the methods of building and maintaining highways.

Good Powder Men

"WHAT is so rare as a day in June?"—a good powder man.

Few construction men these days realize how much a good powder man can save on a hard-rock job. Years ago, when power shovels were not so common, powder men were more appreciated. Of recent years there has been a tendency to underrate the value of first-class ability to shoot rock to the best advantage.

When a shovel outfit makes a good record in moving rock, or tunnel heading crews make unusual progress, the powder man rarely gets the credit due him. But it is hard to overestimate the savings a man who knows how to place and load holes can make over the work done by a man of less ability. And it is not merely in economy of drilling and powder that the capable man shows to best advantage. He handles his shots so the rock is loosened to give the shovel or loader the best chance. Very often he can place a blast so as to throw a good share of the material right where it is to be spoiled.

One peculiarity common to most powder men is that they take a world of satisfaction in their work. And they study their material and their grade stakes as an artist does his job. Some powder men are made. Most of them just naturally know how to place a shot so it will do the best work at the least expense. They deserve more consideration on nearly every job.

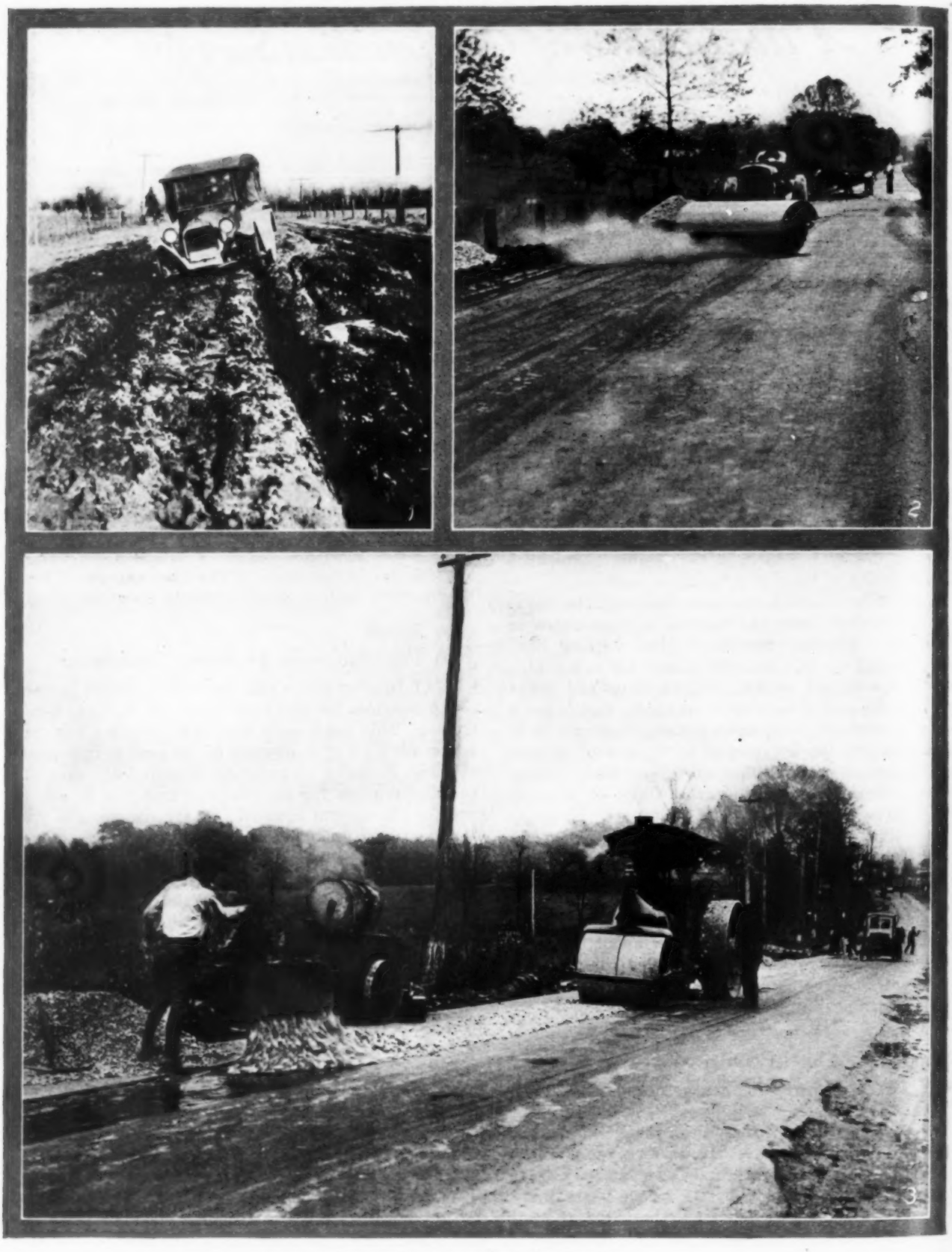
A Pan American Highway Conference

NEXT October there will be held in Buenos Aires, Argentina, the first Pan American Highway Conference. This conference was originally set for the coming May. For a number of reasons it appeared desirable, however, to postpone it until fall. One of the chief reasons for the postponement was to allow time for the several countries to arrange for the appointment and financing of official delegations. The later date also will permit individuals and representatives of private concerns time in which to fix their plans so they can attend as unofficial delegates.

The picture on our front cover and a short article in the text pages show the kind of roads and streets that are being built in Peru. In Argentina, Chile, Brazil, Mexico and Venezuela particularly good progress also has been made. Santo Domingo has a complete trunk line system largely in service. Our friends to the south of us surely are moving fast in highway progress.

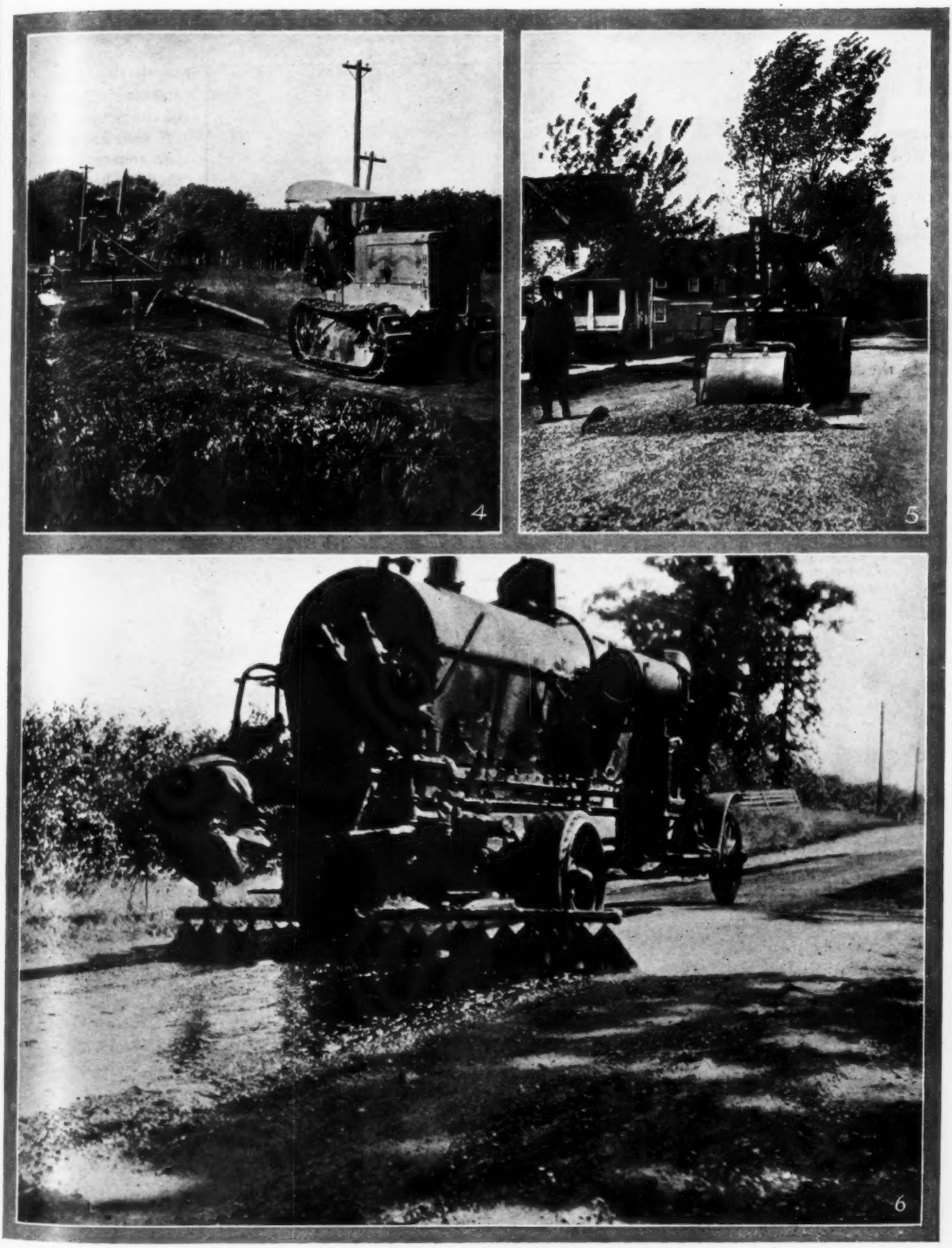
The conference in Buenos Aires will be an eye-opener to all who can attend. The arrangements which are being made for the trip down and back will insure the party an opportunity to see much en route in a very short time. All who care to do so may accompany the official party from the United States. Those who go from here will have an experience of rare value. An opportunity is presented for true co-operation with our Southern neighbors.

Spring Means Work



1. The sort of spring scene that is fast disappearing
2. Brushing the surface of a road preparatory to applying new material
3. Laying and rolling a layer of crushed stone on a bituminous road

On the Highways



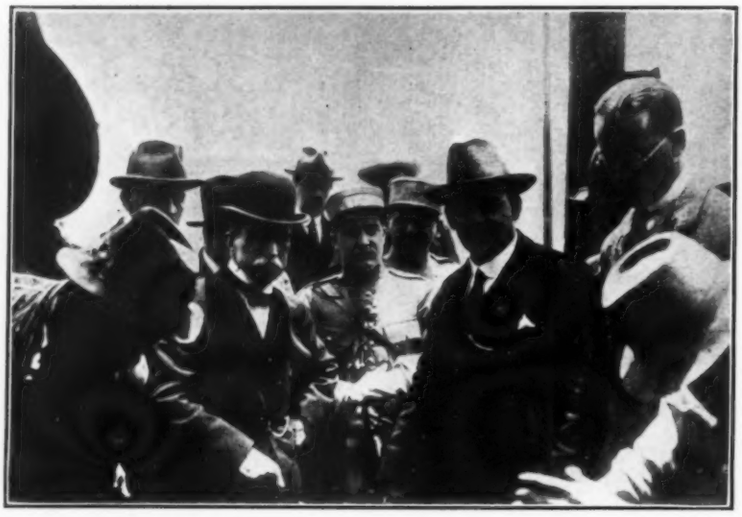
4. Grading the shoulders—a job which has to be done every spring
5. A small roller with grading attachment at work on a gravel road
6. Applying the hot tar on a modern highway

PERU INCREASES MILEAGE OF MODERN ROADS

Foundation Company of New York Builds New Highways in Connection with Sanitation and Water Works Contract

ONE phase of one of the most notable construction contracts now being carried on in a foreign country by an organization from the United States is the building of roads in Peru by the Foundation Company of New York.

The Foundation Company's contract with the Peruvian Government includes the installation of modern sanitation and water works systems, the paving of streets in thirty-two of the principal cities of the country and the construction of a modern highway system through the populous sections of Peru, linking up a number of important cities.



PRESIDENT LEGUIA (LEFT CENTER) INSPECTING THE WORK

Work on the highway program has been going on for about four years. Its rate of progress has, of course, been dependent on the speed with which the sew-

A BIG PAVER MADE IN THE UNITED STATES POSES WITH ITS PERUVIAN ASSISTANTS

ers could be installed, as well as the rebuilding and relocation of the trolley lines in Lima. Since work began about thirty miles of road have been built in Lima and in the vicinity of that city.

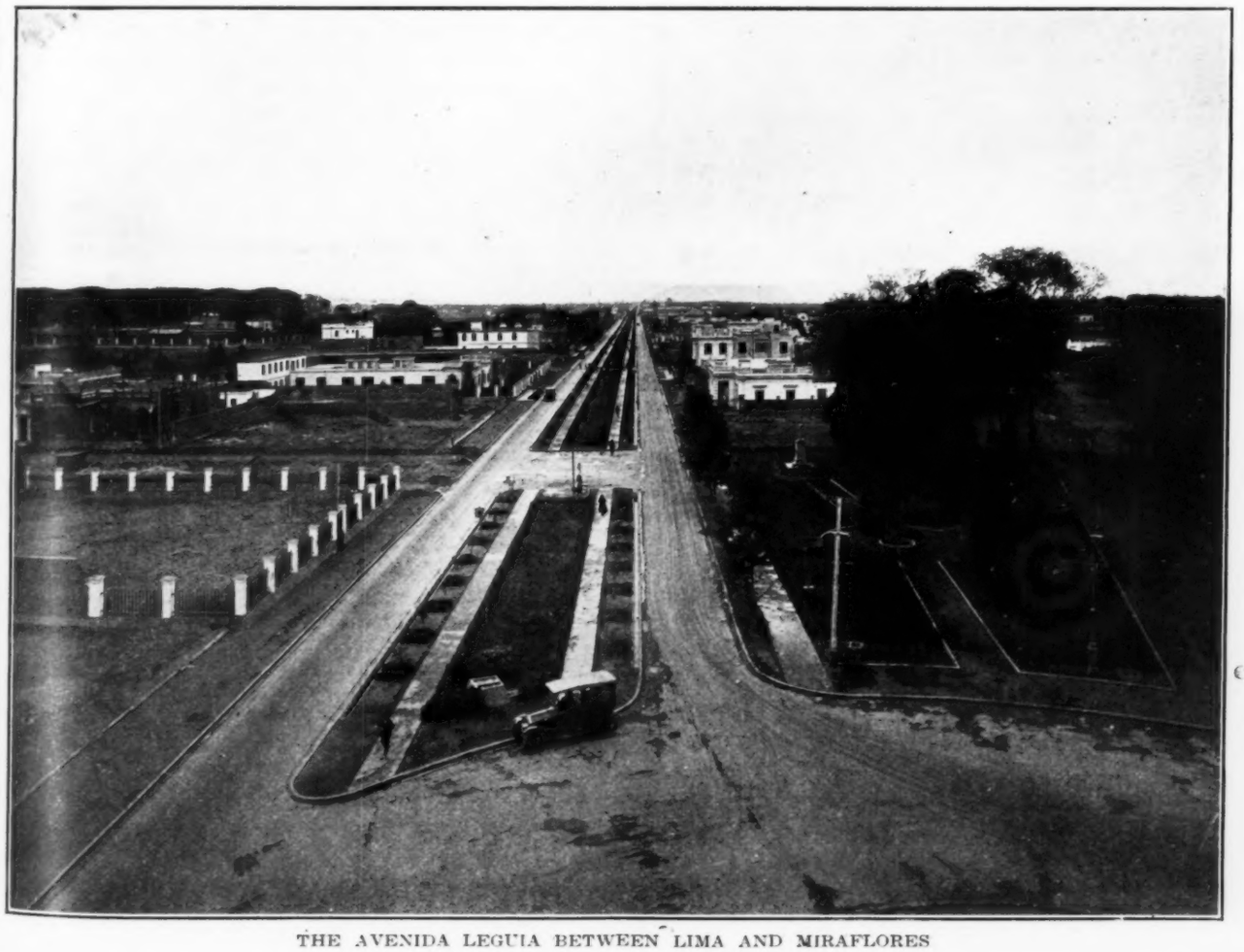
Among the principal roads which have been completed are the motor highway between Lima and its port, Callao, and two other highways to suburbs on the sea near Miraflores and Magdalena. A road also has been built connecting the suburbs of Miraflores and Magdalena. Sanitation work and paving are going on in Cuzco, Arequipa and Ayacucho.

A BUCKET LOADER PICKING UP SAND

In the thirty-two cities in which work will be done there is a total population of about 518,000. The photographs which accompany this article show various phases of the road construction activities of the Foundation Company in and about Lima. Machines made in the United States have been used for this work and are shown in a number of the photographs.

In addition, the Foundation Company on behalf of the Government is operating the cement plant of the Peruvian Portland Cement Company and is reconstructing the plant with a view to doubling the present capacity. The road from Lima to Callao is known as the Avenida Progreso and is a splendid piece of highway construction. This road is 8 meters in width and the base is built of concrete 20 centimeters in thickness. On top of this is a 5 centimeter asphalt surfacing.

In the building of most of the interurban roads, concrete foundations with asphalt tops have been used, but in some of the city streets the concrete roads have been laid with no other surfacing.



THE AVENIDA LEGUIA BETWEEN LIMA AND MIRAFLORES

A WAGON TRAIN FOR HAULING MATERIAL

The work was begun under the administration of President Augusto Leguia, who has taken a keen interest in its development, and has visited the work on several occasions.

THE NEW ROAD FROM LIMA, THE CAPITAL, TO ITS PORT, CALLAO

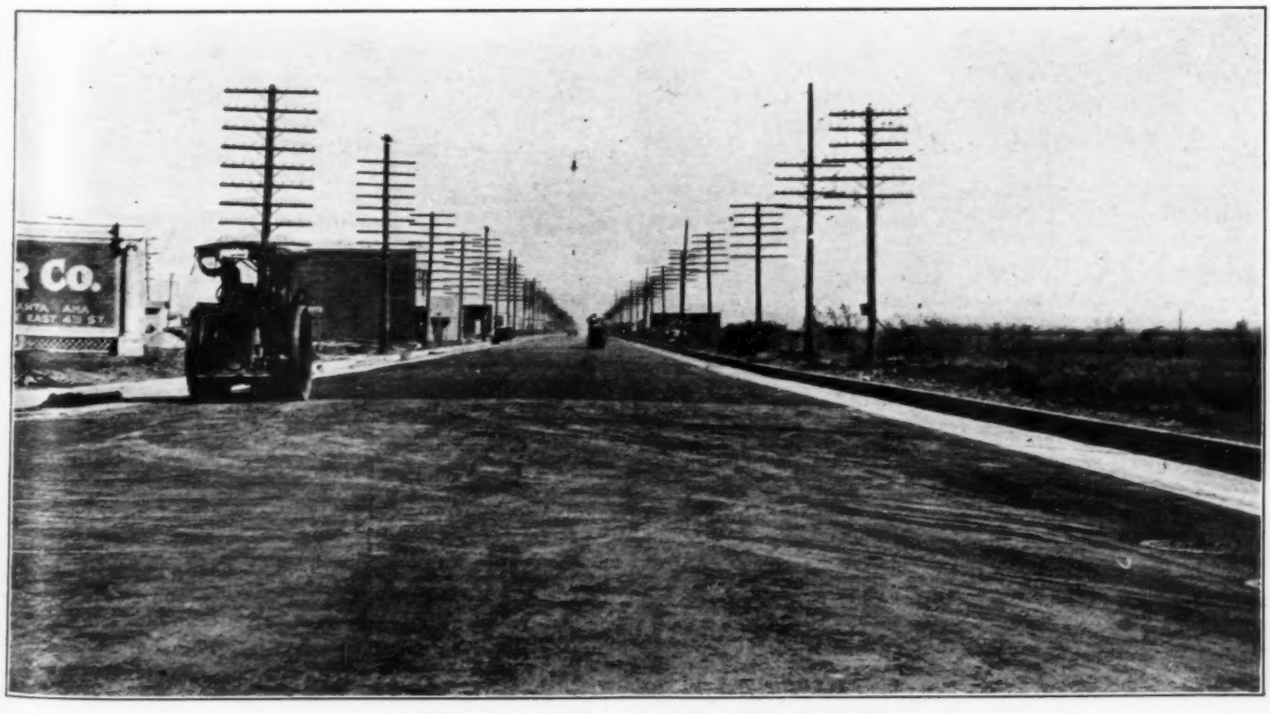
CALIFORNIA'S COSTLY ROAD

State and Los Angeles County Build New Boulevard

ONE of the finest and most expensive roads in California has been constructed recently in Los Angeles County. A street 56 ft. in width and extending on Whittier Boulevard from Pasadena Avenue to Montebello, has been built and about three miles of it have been finished. The State of California, Los Angeles County, and a special road improvement district are paying for the new road, which will cost about $150,000 per mile. As may be seen from the photographs, the road is well built. It has concrete gutters and curbs 6 ft. in width and the pavement is 44 ft. wide. It consists of a concrete base 7 in. thick laid upon 4 in. of rock macadam and disintegrated granite. A 2-in. asphalt wearing surface was placed over the concrete.

On the part of the work done by the State, the concrete base was finished smooth and a coat of asphalt paint was applied to act as a binder between the base and the surfacing. On the portion of the job handled by the county the concrete was artificially roughened before the surface material was applied.

The same contractor handled both State and county jobs, so that it was possible to carry on both simultaneously. The State's half of the job cost approximately $74,000 per mile, which was paid with the proceeds from the gasoline tax and motor vehicle revenues. The county part of the work cost about the same amount, making the total, as said before, approximately $150,000 per mile. The result is a modern road of the highest type.



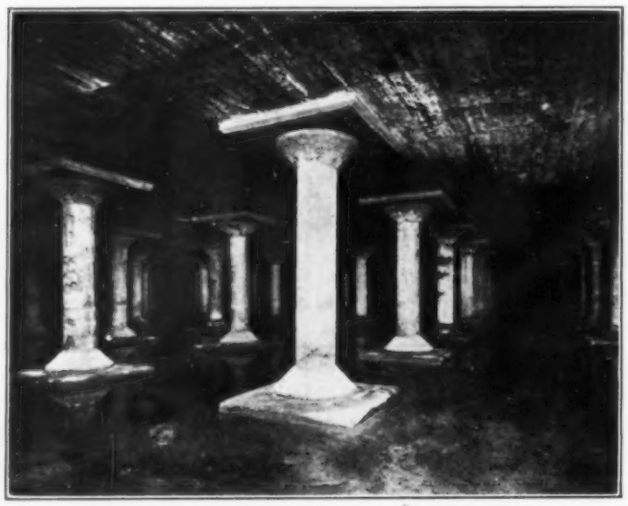
A TYPICAL SECTION OF THE NEW HIGHWAY

BUILDING A RESERVOIR AND PIPE LINE

Chicago Suburb Equips Itself to Buy Water Pumped from Lake Michigan

By Ernest A. Clark
President Subway Engineering Co.

CALUMET CITY, Ill., formerly West Hammond, is the latest suburb to seek the convenience of Chicago's water supply for its own needs and has signed a contract calling for 2,000,000 gal. per day from the Chicago Water Department. This city completes a list of 33 suburbs scattered around the edge of Chicago, which are now being supplied with 17,500,000 gal. of the 838,000,000 gal. of water pumped daily from Lake Michigan by the City of Chicago. The water will be supplied between 1 a. m. and 5 a. m. when the Chicago demand is at its low point, and will be stored in a 2,000,000-gal. reinforced concrete reservoir and pumped from there into the Calumet City mains as required.

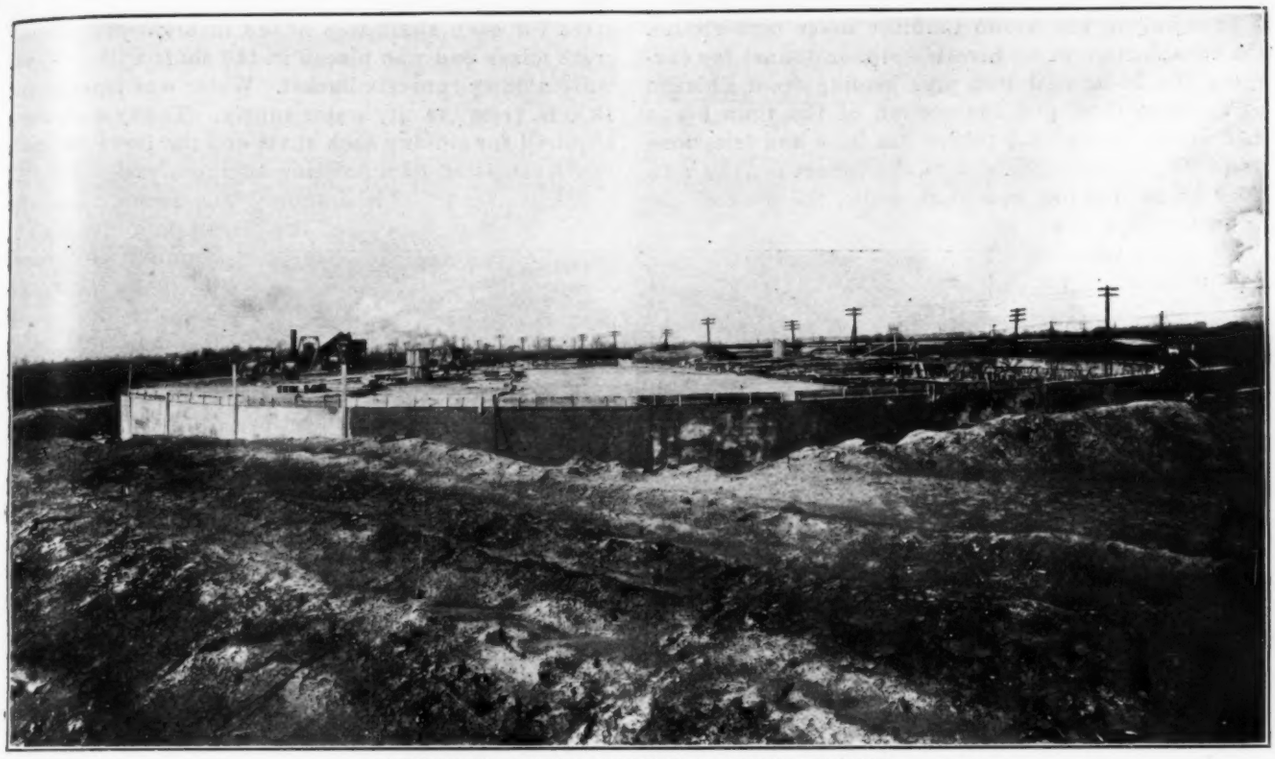


INTERIOR OF RESERVOIR SHOWING SPACING OF COLUMNS

The water will be pumped from Chicago through a 24-in. main laid through and supplying the districts of Colehour, Ford City, Hegewisch and Burnham and passing under the Grand Calumet River in a 7 by 7-ft. concrete-lined siphon tunnel into Calumet City.

The reservoir is a large circular reinforced concrete tank, 180 ft. inside diameter and 13 ft. high, with a capacity of 2,000,000 gal. The floor and roof

POURING FLOOR AND COLUMNS OF RESERVOIR



RESERVOIR AFTER ROOF HAD BEEN POURED

are 8½ in. thick and the circular wall 15 in. thick. Ninety-seven columns 20 in. in diameter support the roof and fill. The 6 ft. of excavation required for the reservoir was excavated with teams and slip scrapers and was stored on the bank around the tank to be used for backfill.

Concrete for the reservoir was a 1:1¾:3 mix, 1½-in. washed gravel and washed torpedo sand being used for the coarse and fine aggregates. Five pounds of hydrated lime were added to the mix for each bag of cement used, and all concrete was mixed in a steam-driven side loader concrete mixer.

The reinforced concrete floor slab rests on a sand foundation and is 184½ ft. in diameter. It was poured in four sections with joints made of zinc plate. A footing was placed under the wall 3½ ft. by 1 ft. and under all joints was placed a footing 2 ft. by 9 in. A sump 7 by 8 ft. and 5 ft. deep was provided for the outlet pipe and a reinforced concrete box 7 by 8 ft. and 5 ft. high resting on the floor was constructed for the inlet pipe. Both inlet and outlet pipes were 24-in. cast iron pipe provided with elbows on the inside of the wall of the reservoir, the inlet elbow turning up and the outlet down. An 8-in. pipe was laid from the bottom of the sump to the sewer in the adjacent street.

Aggregates for the concrete were stored on a plank platform placed on the bank, on top of the excavation and the mixer also was placed on the bank about 13 ft. above the floor level. Concrete for the floor was spouted from the mixer to a 1-yd. hopper and wheeled from there in carts on temporary runways. The surface of the floor was given a float finish and then covered with sand and kept wet for ten days.

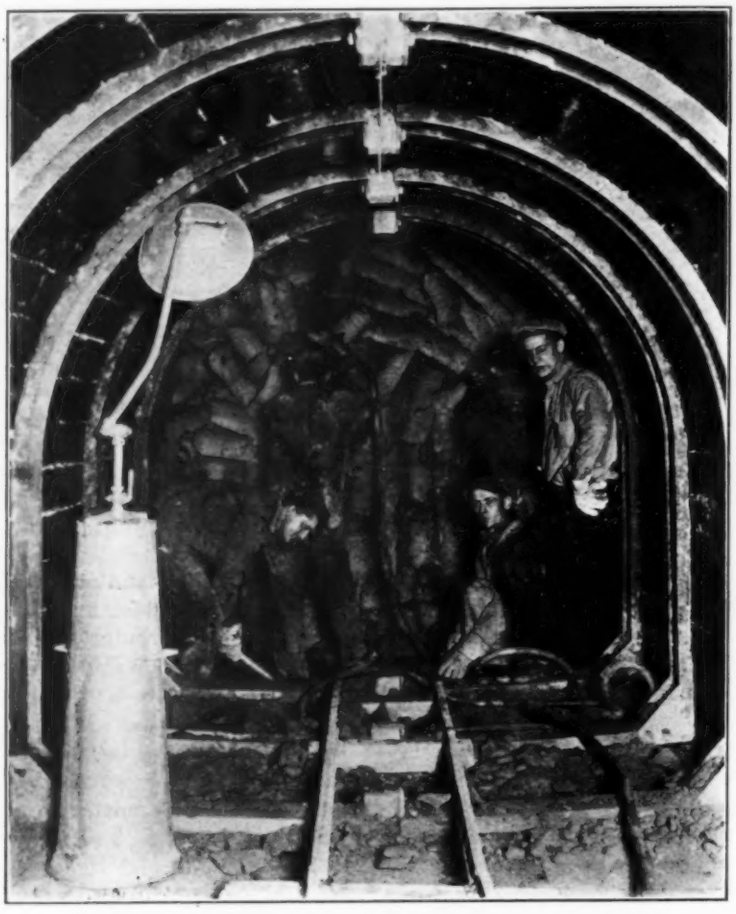
Concrete for the circular wall was poured in two sections with a zinc plate vertical joint and one connecting the floor and side wall. Forms were made of wood with 2 by 6-in. uprights spaced 18 in. apart and 1-in. boards. Circular segments were cut for the uprights to rest upon and to form the circle of the wall. Spreader ties were used for wall spacers and ties for holding the forms. After the forms were removed the spreader holes were filled with mortar and both inside and outside surfaces of the wall were brushed with a paint-like mortar to fill all the small air holes. The wall was kept wet for ten days.

The columns and roof slab were poured from the top, with carts run on a temporary runway resting on the roof form supports. Steel forms were used for the columns. For loading the carts the concrete was elevated with a 24-in. by 28-ft. portable gas-driven belt conveyor which elevated the concrete to a hopper resting on the roof from supports. The roof was poured in four sections with zinc plate joints. The forms for the roof rested on 4-in. by 4-in. supports, with 4-in. by 6-in. girders and 2-in. by 6-in. stringers and 1-in. floor boards. Four concrete vents were placed on the roof, each 30 in. inside diameter with 4-in. walls 5 ft. high.

After the concrete in the roof had set it was covered with 30 in. of sand and 6 in. of black dirt. Before any backfilling was done the reservoir was filled with 4 ft. of water to test for leaks in joint between floor and wall. None was found after 48 hr. and the reservoir was disinfected and backfilled. Excavation was started Sept. 15, 1924, first concrete poured on Oct. 13 and last concrete poured on Nov. 19, 1924.

The cost of the reservoir was about $90,000. It required 2200 yd. of concrete, 115 tons of reinforcing steel, 1500 lin. ft. of zinc plate for joints, 5000 yd. of excavation, 7500 yd. of backfilling and one acre of black dirt and seeding.

Dredging in the Grand Calumet River necessitated the construction of an inverted siphon tunnel for carrying the 24-in. cast iron pipe leading from Chicago to Calumet City, and the section of the tunnel was made large enough for future gas lines and telephone and light cables. The size of the tunnel is 7 by 7 ft. with an arched top and 10-in. walls, the floor of the tunnel sloping 6 in. to a sump at the south shaft for drainage. At each end of the tunnel is a 10-ft. shaft 60 ft. deep with 18-in. walls. The distance center to center of shafts was made 263 ft. to provide for a 250-ft. channel in the river. Nearly all of the excavated material was taken out of the south shaft and will be used for covering the sand in an adjacent park.



PUTTING THROUGH SIPHON UNDER CALUMET RIVER

For the first 15 ft. of the south shaft the excavated material was fine waterbearing sand with few layers of shells and gravel; in the north shaft the excavation was through black muck for about 15 ft. with a layer of gravel and shells just on top of the clay. The remainder of the shafts were through clay, small boulders and small pieces of slate, the clay getting harder and tougher as the shafts were deepened. Open dredging was used in the south shaft to the top of the tunnel and then underpinning from there to the bottom. Little water was found 35 ft. below the surface, though small waterbearing sand pockets were encountered. Below 45 ft. the muck was excavated with pneumatic shovels and hoisted in ½-yd. tipover buckets.

Equipment for the south shaft consisted of a small traveling derrick 11 ft. gage with a 40-ft. boom and steam hoisting engine with a swinger to handle a ½-yd. clamshell bucket. The north shaft equipment consisted of a 2-ton stiff leg derrick, 36-ft. boom operated with a gas-driven hoist. As little water was encountered, the excavation was done by hand to a depth of 40 ft. Then pneumatic shovels were used. The shell was concreted upon the top and allowed to sink for about 40 ft. and then was underpinned from there to the bottom of the shaft.

Air for ventilation and for operating the pneumatic shovels was supplied by a horizontal compressor. Concrete for each shaft was mixed in a gas-driven concrete mixer and was placed in the shaft with a ½-yd. bottom dump concrete bucket. Water was piped about 1000 ft. from the city water supply. Thirty days were required for sinking each shaft and the force for each shaft consisted of a hoisting engineer and 6 men.

About 250 ft. of the tunnel was mined from the south shaft, through a hard, tough clay containing slate and small boulders. Six feet was mined and concreted on each 9-hr. shift. Each shift consisted of a hoisting engineer, 3 pneumatic shovel miners, 2 muckers and 3 top-men. Where sand pockets occurred the tunnel was mined, timbered and concreted in 3-ft. sections. Material excavated was handled in ½-yd. buckets set on 14-in. gage cars run on a 16-lb. rail track. The buckets were used both for handling the muck and the concrete. Steel ribs were used for forms made of 6-in. 8-lb. channels and made in two pieces, with angle iron lugs at top and bottom for bolting together with a 3-in. wood spacing block. Gravel concrete of a 1:2½:4 mix was used in both shafts and tunnel. Concrete for the tunnel was shoveled and tamped into the forms.

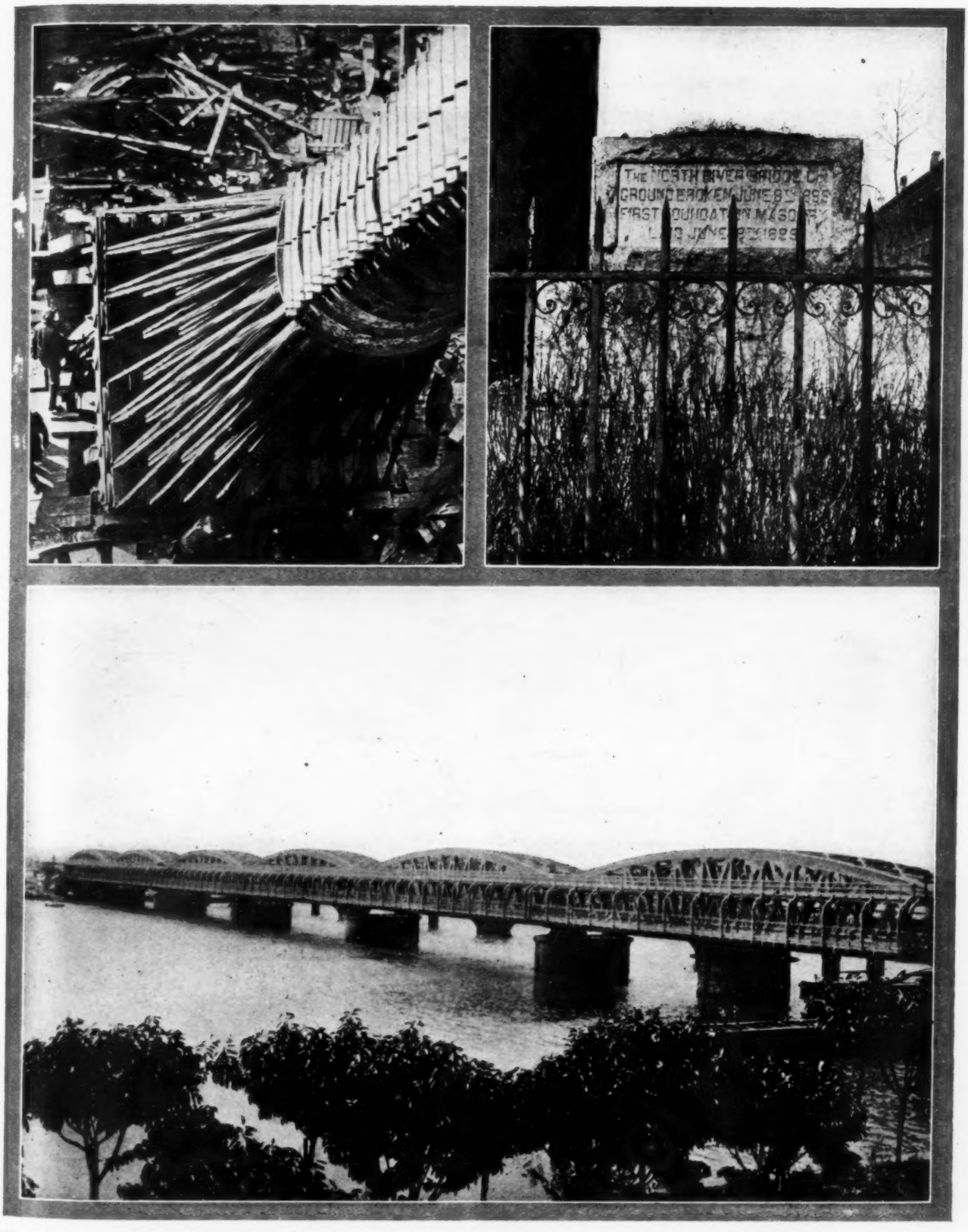
After 24 hr. the forms were removed and the surface brushed with a 1 to 2 paint like mortar to fill all the small holes.

The 24-in. cast iron pipe was placed in the tunnel on wood blocks. Then concrete blocks were cast under the pipe 8 ft. apart. In the shafts the pipe was anchored to 7 in. 15 lb. channel spaced 6 ft. apart, with ¾-in. "U" bolts. A 24-in. gate valve was placed in a valve chamber at the top of each shaft.

The Subway Engineering Company of Chicago was contractor for the reservoir and siphon tunnel, and the Consoer Engineering Company of Chicago were engineers for the work. The cost of the siphon tunnel was about $50,000. It was completed in three months.

The speed with which the entire job, including both the reservoir and the tunnel, were put through has made it possible for Calumet City to make use of Chicago water with the least possible loss of time.

Three Great Bridges



Upper left—A giant "squeezer" at work on the strands of the cable of the new Delaware River Bridge between Camden and Philadelphia © *International.*

Upper right—A monument to a bridge that was never built. It was to have spanned the Hudson between New York and New Jersey © *International.*

Below—The new railroad bridge across the Nile near Cairo © *International.*

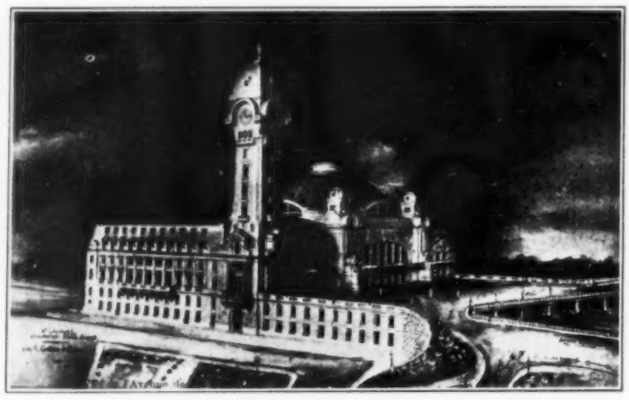
AMERICAN CONCRETING PLANT BUILDS BIG RAILWAY STATION IN FRANCE

Tower and Chute Made Here Are Handling Construction Job in Limoges

By A. Boyer,

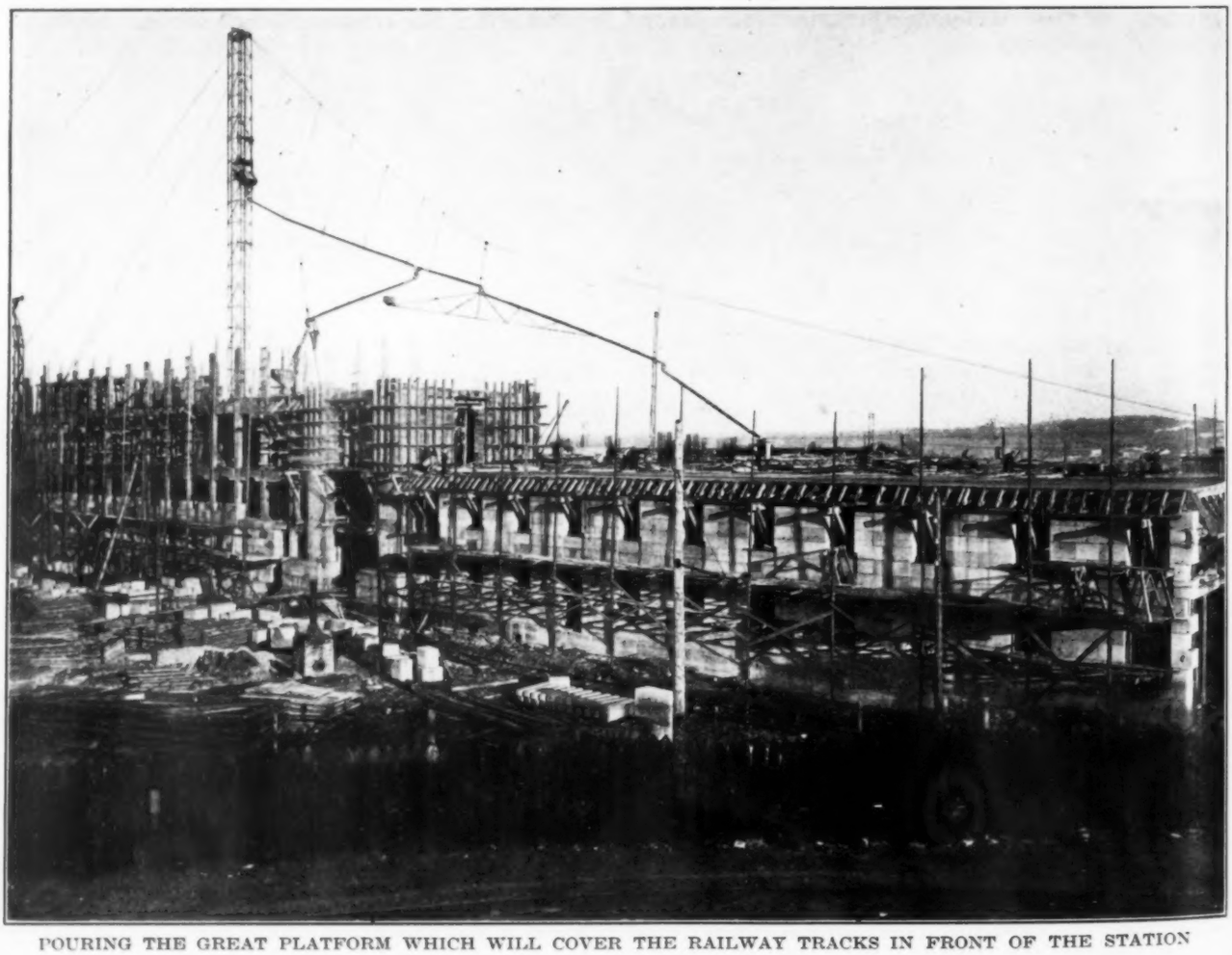
Directeur-Adjoint to the Societe des Grands Travaux de Marseille

ONE of the important construction jobs now under way in France is the railroad station at Limoges. This great structure, which is on the Paris-Toulouse line of the Paris Orleans Railway, includes the main building, platforms and train sheds. The small photograph shows a plaster model of the new station. Work began early in 1924 and the contract with the Societe des Grand Travaux de Marseille provides that all tracks must be continually kept open for traffic. This meant, of course, that careful planning would be necessary in order not to violate this provision of the contract.



PLASTER MODEL OF NEW RAILWAY STATION AT LIMOGES

All of the concrete placing equipment used on the job was made in the United States, the tower method of chuting the concrete being used. The large photograph at the bottom of this page shows the work in progress a month or two ago. At that time a large part of the platform over the tracks, which is plainly shown in the plaster model, had been finished. The steel tower with its counterweighted chute may be seen engaged in the work of pouring the concrete for the platform.

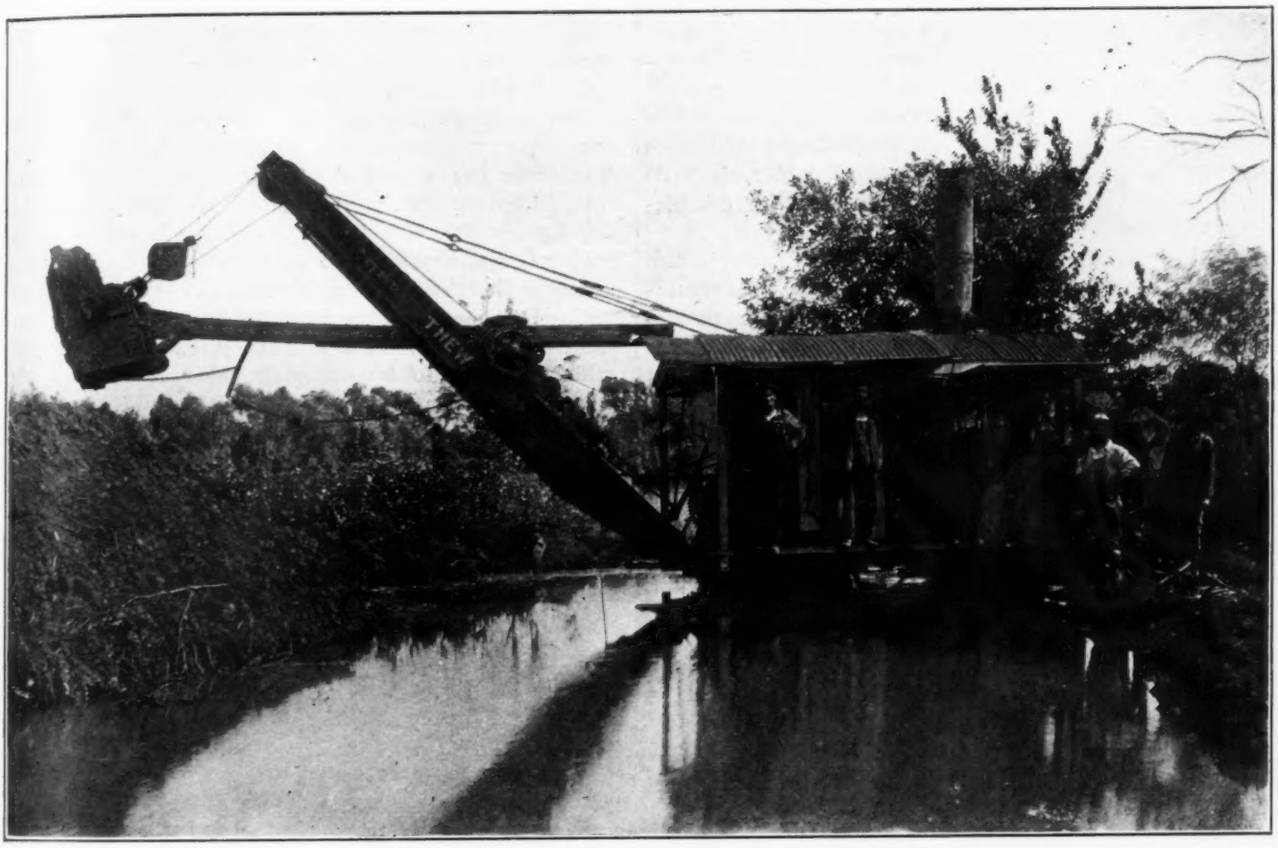


POURING THE GREAT PLATFORM WHICH WILL COVER THE RAILWAY TRACKS IN FRONT OF THE STATION

AN AMPHIBIOUS SHOVEL

Half Immersed for Nine Months on Job Near Dallas, Texas

AT this time of year when the ground is full of water and streams have a habit of overflowing their banks, a machine that can handle itself, no matter what the conditions, is a handy tool for a contractor to have as one of the units of his construction plant.



THE SHOVEL UP TO ITS MIDDLE IN THE CANAL

The steam shovel shown in the photograph at the bottom of this page undertook the job of enlarging a drainage canal near Dallas, Texas. This canal had proved inadequate to carry off the water which accumulated after a heavy rain and it was decided to enlarge it. The shovel, operated by H. F. Huff of Blair, Neb., tackled the work in spite of numerous predictions that it would not be able to finish it successfully.

It began operations at the mouth of the stream and worked upward, widening the canal as it went along. It is mounted on continuous tread traction, and as may be seen in the photograph, none of this part of the machine is visible. At times after heavy rains the water rose as high as the turntable floor, but the machine was still able to operate. Whenever a bridge was reached the shovel climbed the bank, went around the end of the bridge and descended into the creek on the other side. This was done entirely on its own power.

In some places the bank was almost vertical and it was necessary to dig away enough of the bank to enable the traction to take hold. At times quicksand was encountered, but the shovel survived this peril without serious difficulty. One of the greatest problems was keeping the shovel supplied with coal, as in some places the ground on each side of the ditch was so swampy that the coal wagon could not get within a quarter of a mile.

In addition to excavating the ordinary material, the shovel frequently had to handle large stumps and remove trees which were growing along the banks of the canal. The work extended over a period of 9 months.

PLANNING FOR THE FUTURE

THE necessity of planning for future traffic has been recognized by the Board of Supervisors of Du Page County, Illinois, which is immediately west of Chicago. At a recent meeting, E. L. Gates appeared before the Board with a plan for securing two rights of way at least 198 ft. wide across the county, an approximate distance of 20 miles, in order to anticipate the needs of the future.

MOTORIZED EQUIPMENT HANDLES EARTH FOR WANAQUE DAM

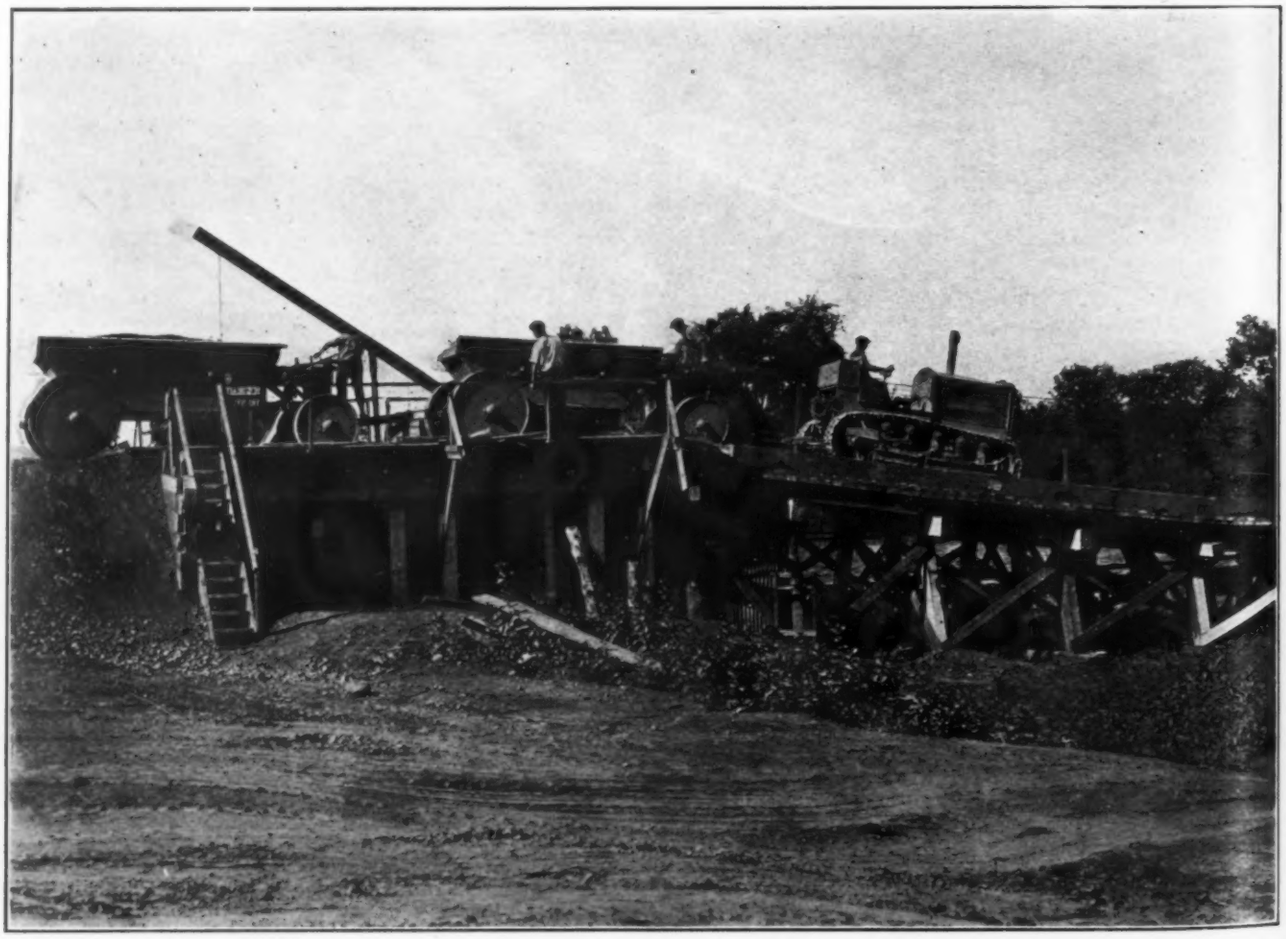
Tractors with Wagon Trains Maintain Steady Schedule on Big New Jersey Reservoir Job

THE construction of the Wanaque Dam in New Jersey which will form a reservoir for the purpose of supplying water to Newark, Montclair, Paterson and other Jersey cities, was described in the July, 1922, issue of SUCCESSFUL METHODS. This great reservoir, which will cost about $20,000,000 and will have a capacity of 28,000,000,000 gal. of water, is still under construction, the contract calling for completion by June 1, 1927.

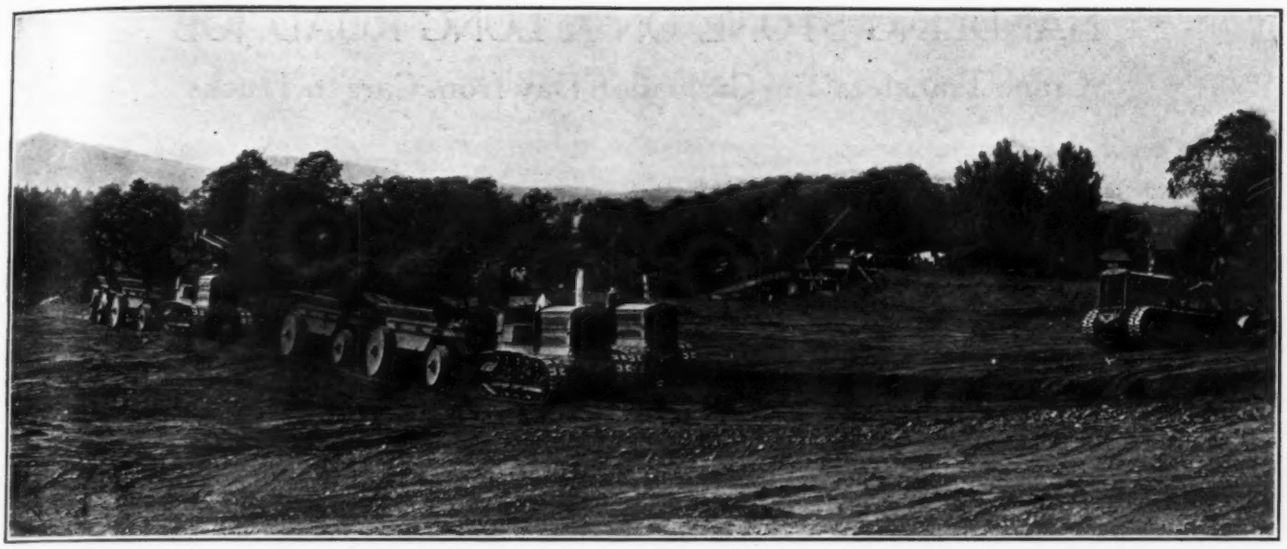
As stated in the previous article, a clause in the contract forbids the use of animals within the reservoir wherever it is practicable to use other power, and therefore some very interesting methods of utilizing tractors and equipment of a similar nature have been worked out.

The nature of the fills forming the dam was such that the usual methods of dumping the earth directly upon the fill were not practicable. A carrier system, therefore, was constructed which handles the earth from the end of the dam to the points where it is needed on the fill. This carrier covers a distance of one-half to three-fourths of a mile. It receives the earth from a specially constructed hopper and distributes it uniformly over the fill.

The earth is supplied to the carrier in the following manner: An elevating grader, pulled by a 10-ton tractor to the actual excavation, loads the material into dump wagons. These dump wagons, each holding 6 yd. of earth, also are hauled by 10-ton tractors, each of which pulls two or three wagons. A very steady schedule has been worked out so that the elevating grader and the four wagon trains are continually in motion with the exception of the wagons which happen to be dumping their loads into the receiving hopper of the carrier. Although the tractors with their wagon trains have to make their way about over rather soft and rough ground, they have no difficulty in maintaining their schedule and keep the earth flowing in a steady stream out over the carrier which deposits it on the dam.



DUMPING MATERIAL INTO HOPPER OF CABLEWAY WHICH DEPOSITS IT ON EARTH DAM



ELEVATING GRADER LOADING WAGONS. SECOND WAGON TRAIN IS READY TO MOVE FORWARD WHEN FIRST LEAVES

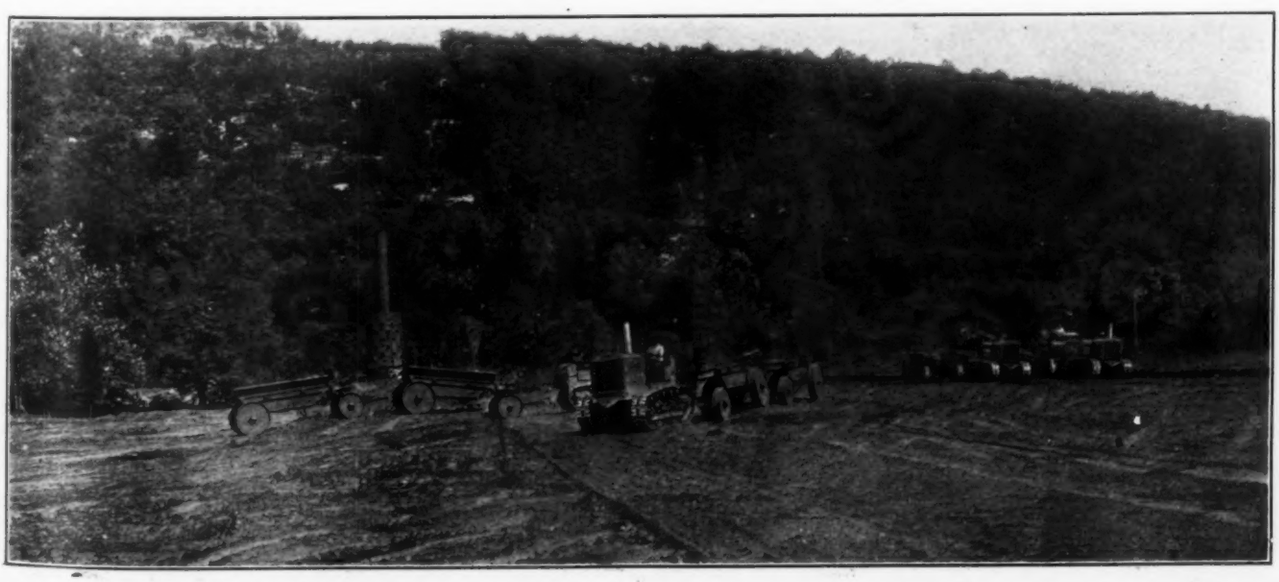
The photographs which accompany this article show the work in progress. In the large photograph at the bottom of the previous page a tractor hauling two wagons is seen halted over the hopper of the carrier while the wagons are being dumped. The upper photograph on this page shows the elevating grader at work and three of the wagon trains in sight at the same time. One is being unloaded and is about ready to pull away, while another is directly behind to take its place beside the grader. A third tractor, pulling two wagons, may be seen at the right of the photograph heading for the end of the cableway which is in the right background.

The lower photograph gives a good idea of the sort of ground over which the tractors and wagons have to make their way. One of the three wagon trains shown is traveling over some pretty rough territory on its way back from the cableway.

As the contract calls for the moving of approximately 2,000,000 yd. of earth on the entire project, this motorized earth moving equipment will have plenty of work to keep it busy for some time to come. The Clifford F. MacEvoy Company is the owner of this efficient earth moving plant.

When completed, the Wanaque Dam will be one of the largest earth dams in the country. It is under the direction of the North Jersey District Water Supply Commission and the ultimate development of the watershed, which has a direct tributary area of 27 square miles and an additional tributary area of 27 square miles through Greenwood Lake will provide for 80,000,000 to 90,000,000 gal. daily.

Work has been going on since shortly after the letting of the first contract in November, 1920, and, as previously stated in this article, the schedule calls for completion by June 1, 1927, making the span of the entire job between 6 and 7 years. A job of such magnitude cannot be done over night.



THREE WAGON TRAINS ON THE JOB. THE TRACTOR IN THE CENTER IS HAULING TWO LOADED WAGONS FROM THE GRADER TO THE CABLEWAY

HANDLING STONE ON A LONG ROAD JOB

Crane Transfers Ten Carloads a Day from Cars to Trucks

UNLOADING the stone for the base of a 23-mile road constructed recently in Shelby County, Alabama, was one of the problems which confronted the contractor. The specifications called for a rolled stone base with an asphalt top and this meant the use of about ten carloads of limestone a day. Because of the length of the job different railroad sidings were used and the stone always was delivered at the siding nearest the work then going on.

LOADING TRUCKS WITH STONE

This made it impracticable to construct an elaborate unloading plant which would be hard to move, and a crane mounted on a motor truck was obtained to handle the stone. As the stone was brought in hopper type cars, the crane, which was equipped with a clamshell bucket, first dug a pit alongside the track and an incline under the track so that the material as it was dropped out of the car rolled out into the pit clear of the track. When the stone was unloaded one of the drop doors on the car bottom was opened and with the aid of the incline the stone flowed out where the crane had no difficulty in getting hold of it.

Motor trucks then were placed beside the crane, as shown in the smaller photograph, and were loaded quickly. The crane started its work at Pelham and moved from one siding to another at motor truck speed and so did not delay the work. On the last day at Pelham the crane unloaded 11 cars of limestone without working the trucks one minute overtime. The usual average was 10 cars a day.

The lower photograph shows the layout from another angle. The clamshell bucket is at the bottom of the excavation into which the stone drops when the doors in the bottoms of the freight cars are opened. The depth of the excavation is plainly shown by this picture.

This method of transferring stone from freight car to motor truck with a minimum of handling equipment proved entirely satisfactory. It eliminated the building of bins or the double handling of the stone that would have been necessary if it had first been unloaded from the cars placed in stock piles and at last loaded into the trucks. By moving so easily from one siding to another as the work progressed, the crane also kept the length of the truck haul at a minimum.

THE BUCKET IS PICKING UP STONE FROM EXCAVATION IT HAS PREVIOUSLY MADE

A Trio of Odd Jobs

Upper left—Eros, the Love God of the crossword puzzle, leaves his perch on a London monument © *Keystone.*
Upper right—A new radio tower on one of the tallest buildings in New Orleans gives the workmen a chance to show their agility. © *International.*
Below—These men are not drilling for oil. They are making soundings for one of New York's new subways which will pass under Trinity Churchyard. The tomb by which they are working is that of Richard Lawrence of "Don't Give Up

CUTTING THROUGH CORAL

Ditcher Strikes Hard Job in Southern Florida But Stands the Gaff

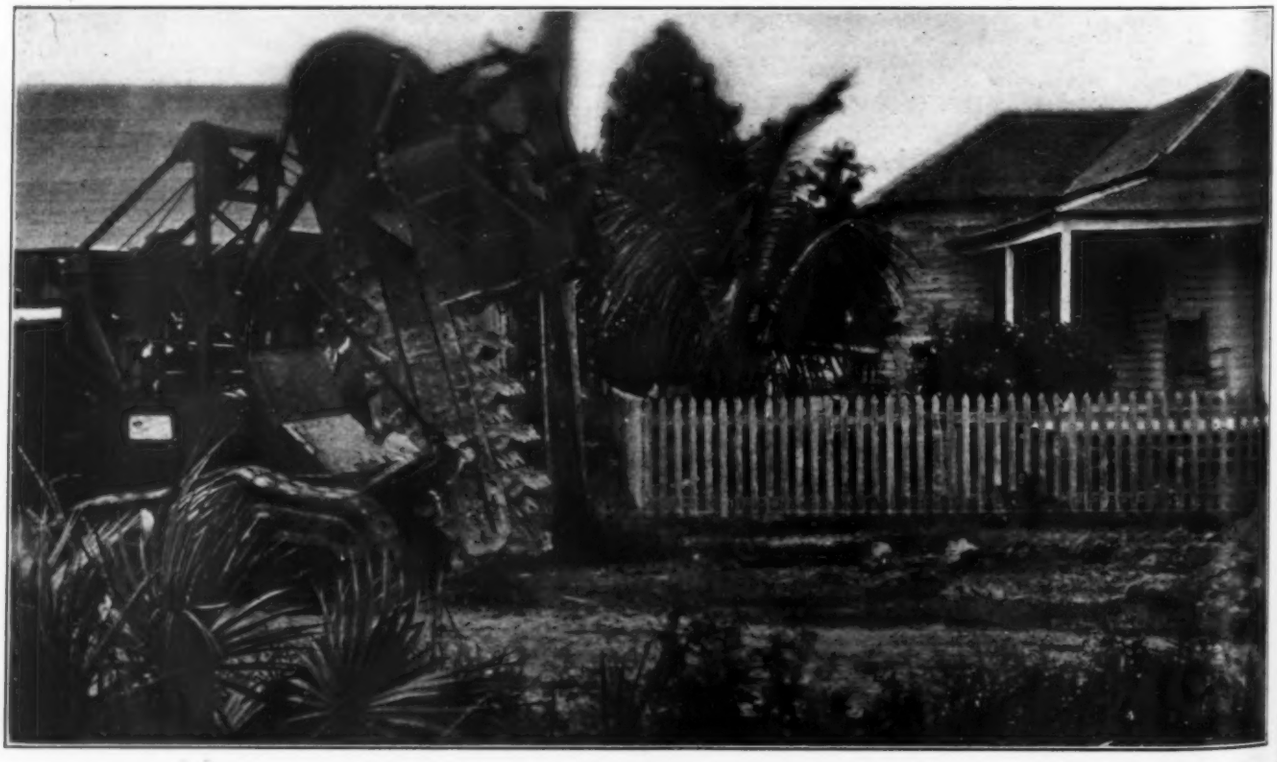
FLORIDA land moves quickly these days in the hands of the real estate operators, but when it comes to moving it for the purpose of digging trenches there is a different story. A limestone and coral formation covered by a thin layer of sand underlies the southern part of the State, and excavation has always been a difficult job in that section.

The John W. Rollins Company of Miami entered into a sub-contract with the Phoenix Utility Company to dig 7 miles of trench for the Gas Department of Florida Light & Power Company. The shallowest sections of the trench were 54 in. in depth and the job was done by a ditcher. This machine, which is shown in the photographs which accompany this article, is of rugged construction, and had to be in order to survive the continuous pounding to which it was subjected by the digging through the coral rock. In addition, it is equipped with an arrangement which enables the operator to throw out the traction clutch and lift the boom in order to get the machine around posts.

CUTTING A LATERAL THROUGH CORAL ROCK

A FIVE-FOOT TRENCH UNDER A MACADAM PAVEMENT

The large photograph at the bottom of this page shows the machine going around a telegraph pole with the boom and entire digging equipment clear of the ground. As soon as the boom had cleared the pole it began to dig into the ground at the rate of a foot a minute. On this 7-mile job the Rollins Company averaged about 400 ft. a day. In addition, the machine cut a number of trenches for curb and gutter forms 18



TAKING THE DITCHER AROUND A TELEGRAPH POLE

CONVEYOR HAS JUST BEEN SHIFTED TO OPPOSITE SIDE OF MACHINE TO AVOID INTERFERING WITH PORCH

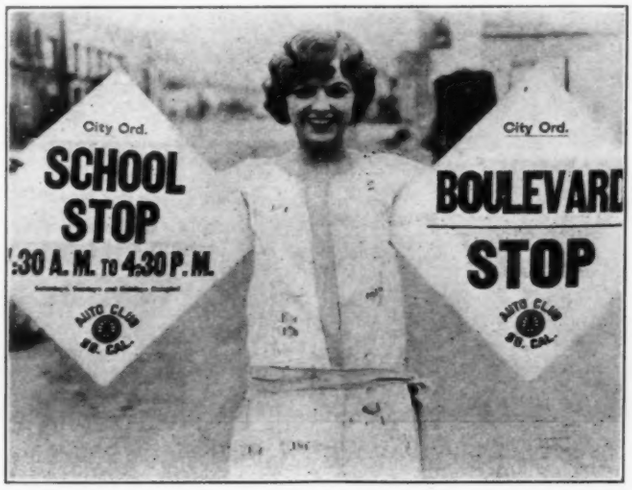
in. deep. In normal soil this work could have been done at the rate of 10 ft. per minute, and the fact that in the coral rock formation it averaged 3 ft. per minute shows how hard the rock is.

The machine also has been used by the Rollins Company for digging post holes for electric light and telephone poles. On this sort of work it has dug as many as 40 holes a day, carrying them to a depth of 5½ ft. At present it is engaged in that sort of work.

A FEW MORE ROAD SIGNS

THE article regarding highway signs which appeared in last month's issue of SUCCESSFUL METHODS has brought forth some more examples of how roads should be marked. The two small photographs at the bottom of this page show how the Illinois Highway Department is calling attention to the danger spots along the roads in that State.

The large photograph in the middle comes from California, where the Automobile Club of Southern California has for many years been engaged in marking the highways. These two signs are typical of those designed by the club for use in cities. The means taken for exhibiting the signs in this particular picture is an excellent one, although it is hardly practical for 24 hr. a day service. The young lady's arms might become a little weary.



WHEN SPEED WAS IMPORTANT

Truck, Tractor and Plow Join Forces to Excavate Trench at Roadside

IT became necessary recently for the maintenance department of the Essex County, New Jersey, Road Committee to lay 550 ft. of storm sewer in the shortest possible space of time. The work consisted of the placing of 24-in. reinforced concrete pipe in the shoulder of the road at such a depth as to obtain a minimum cover of 2 ft.

TRACTOR OFFSETS SIDE THRUST

A maintenance crew was brought to the site of the work. A 5-ton truck and small tractor were pulled up on the pavement parallel to the line of the proposed trench. An extra heavy farm plow was attached to the truck by a heavy tow chain. In the meantime the workmen had felled and trimmed a sapling, one end of which was bound to the rear of the tractor and extending at right angles to its line of travel. The other end was fastened to the tow chain at such a point as to offset the side thrust due to the angular pull of the truck, thus holding off the plow in a straight furrow.

As soon as the plow had cut its first furrow the laborers began casting out the loosened material with hand shovels. As the plow was pulled up and down the entire length of the trench and the depth of the excavation increased, it was difficult to remove the earth as fast as it was loosened.

The trench was rapidly excavated until the required depth of 64 in. below the center line grade of the street was reached. From this point on, the grading and trimming of the trench was quickly accomplished.

Due to the equipment used the economy of this procedure might be questioned. The only answer that can be made is that in this case the dominating factor was the necessity of completing the work immediately, making it a case of ingenuity exerted against time and available equipment rather than ingenuity exerted against cost. And as speed can easily be translated into dollars and cents in the construction business, there can be little doubt of the fact that this method paid for itself even though it did require the use of considerable valuable equipment. The plan was devised by Fred L. Baldwin, Superintendent of Maintenance, Essex County, New Jersey.

GETTING DOWN TO THE BOTTOM OF THE TRENCH

JANDA JOINS HIGHWAY RESEARCH BOARD

THE Highway Research Board of the National Research Council, of which Charles M. Upham is director, announces the appointment of H. F. Janda as assistant director. Mr. Janda is a graduate of the University of Wisconsin and for two years was assistant city engineer of Portage, Wis. Mr. Janda has not only had a variety of practical experience in engineering, but also was instructor and assistant professor of civil engineering at the University of Cincinnati for five years. As associate professor of highway engineering at the University of North Carolina for three years, he was in charge of experimental research in cooperation with the State Highway Commission. Mr. Janda has carried on many important research projects in recent years. He will be located in the offices of the Highway Research Board in the building of the National Academy of Sciences and National Research Council, Washington, D. C.

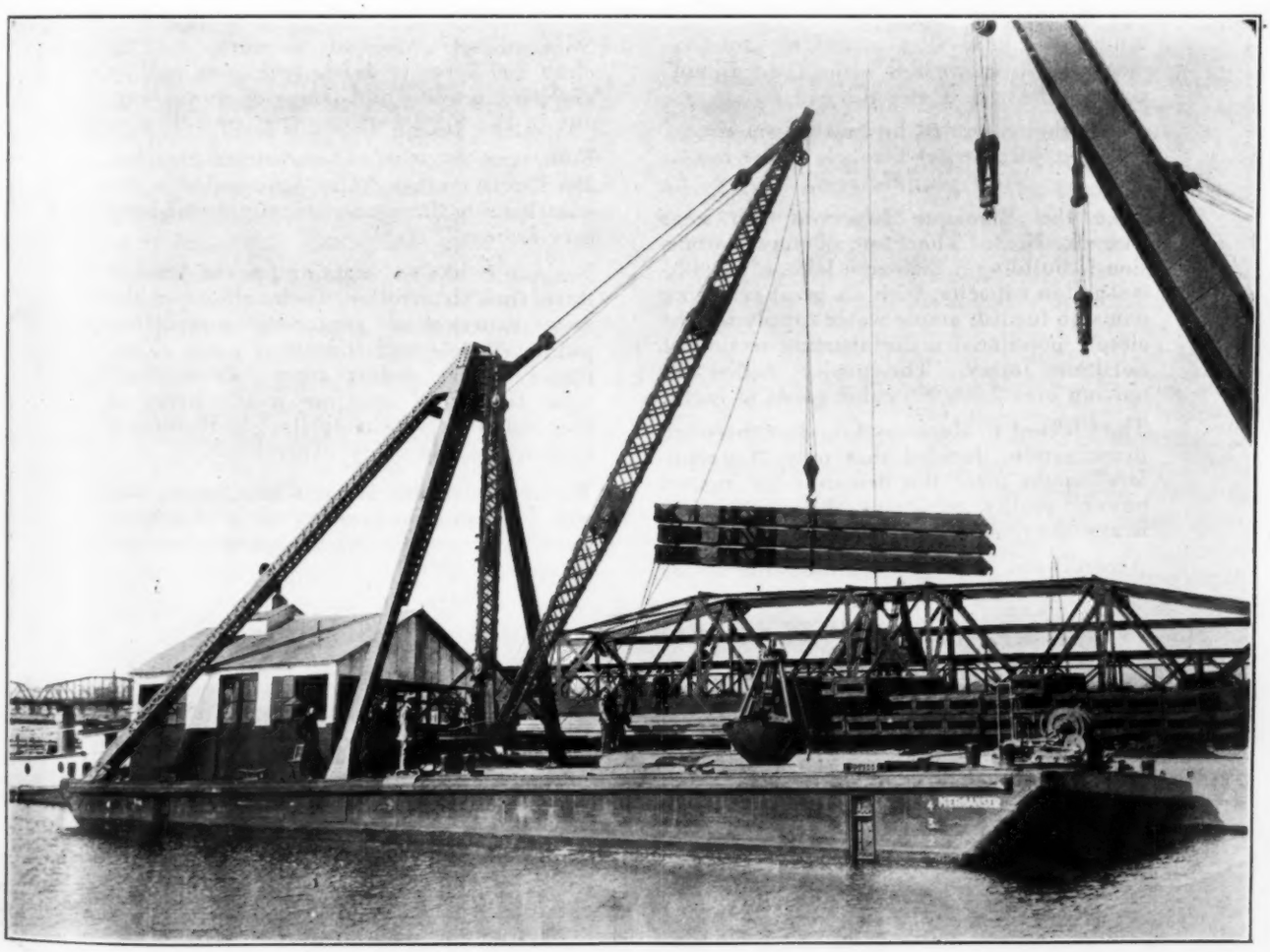
NEW DERRICK BOAT TO KEEP CHANNEL OPEN

Will Be Used in St. Mary's River, Michigan, to Clear Way for Inter-Lake Traffic

THE St. Mary's River, near Sault Ste. Marie, Mich., handles such an enormous tonnage of traffic that it must continually be kept free of all obstructions. The Engineering Department of the United States Army, which is in charge of the maintenance of navigable rivers, recently put into commission a new barge or derrick boat for this work.

This derrick boat, which is named the Merganser, is shown in the photograph at the bottom of this page. It is an all-steel boat 88 by 30 by 6 ft. and carries a steel derrick with a 60-ft. boom and has a capacity of 10 tons. This derrick is equipped with an orange peel bucket as well as a grapple hook.

The boat, which was built by the Marine Iron & Shipbuilding Company of Duluth, cost about $48,000, and since it was put into commission has been doing excellent work in preparing for the spring traffic. The photograph shows the boat during its trial at Sault Ste. Marie. The test load which the derrick is holding suspended in mid-air consists of wickets for the emergency gate above the locks at Sault Ste. Marie and weighed 10 tons.



DERRICK BOAT UNDERGOING OFFICIAL TEST

Motorized with "Caterpillars"

When you hear that a difficult tractive-power job is motorized with "Caterpillars" you may be sure of two things

that the work will be finished *on time*
that it will be put through at the *lowest possible cost.*

Take the Wanaque Reservoir job near Newark, N. J. The State Water Commission is building a 2300-acre lake, of 28,000,000-gallon capacity, with six great retaining dams, to furnish ample water supply for the closely populated manufacturing section of northern Jersey. The project called for moving over 2,000,000 cubic yards of earth.

The Clifford F. MacEvoy Co., after thorough investigation, decided that only "Caterpillars" could meet the demands for rugged power, ability to stand the continuous heavy duty, and the lowest possible costs.

Accordingly, a fleet of 5-ton and 10-ton "Caterpillars" was put to work, helping clear 700 acres of land, and then pulling elevating graders and trains of dump wagons in the huge earth-moving operation.

Following months of continuous service, Mr. MacEvoy says, "The 'Caterpillar' is unquestionably the most efficient power I have ever known."

Because it has the stamina for the hardest duty, the "Caterpillar" is the choice of the most experienced engineers, contractors, public officials and industrial users. Continual repeat orders from "Caterpillar" users the world over are steady proof of how completely "Caterpillar" performance measures up to every expectation.

We have a wealth of facts and figures that will aid you in organizing most effectively your power needs. Check up now and get in touch with us.

"The Nation's Road Maker"

There is but one "Caterpillar"—Holt builds it

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Peoria, Illinois Stockton, Calif.

Export Division—250 W. 54th Street, New York

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